Social Innovation, a dynamic and sustainable social-ecological asset for regional development? Challenges and possibilities in Costa Rica.

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Abstract

This paper elaborates on and examines the connections between social innovation and governance of social-ecological systems. The aim is to develop a conceptual framework to analyse the significance of social innovations for regional development. It is argued that in social-ecological systems the emergence of new practices and social arrangements have the potential to enhance adaptive capacity, which allow regions and their governance to use crises and conflicts into opportunities to develop and evolve. Within the governance of social-ecological systems, new social practices develop and interact at different territorial levels, giving rise to multi-layered processes and spatial dynamics affecting and transforming the management and decision-making over common resources. Discussion is guided by: How does social innovation and governance of social-ecological systems relate in regional development? Does this relation bring adaptive capacity to a region? These questions are discussed from a theoretical perspective while empirical illustrations from Huetar North Region in Costa Rica give examples of what can be analysed through the proposed conceptual framework. It is intended to draw attention to social innovations that are being developed to foster regional sustainability. Moreover, the interest is to determine if these dynamics could contribute to an adaptive development of the region, and how.

Keywords: governance of social-ecological systems, regional adaptive capacity, regional sustainable development, social innovation, socio-spatial transformations.

1. Introduction

Environmental and social-economic challenges manifest continuously in contemporary times, and the management of resources is crucial to for the development of human society in sustainable ways. Through this perspective it is essential to pay attention at social-ecological systems and their governance, not only in a structural way, but to understand the complexities within their interactions (Ostrom and Cox 2010). Furthermore, delineate thoughts from the analysis of the governance of social-ecological systems that may allow regions reproduce good and effective practices within their social-ecological systems. From a socially sustainable perspective (Parra 2013) and by proposing an interdisciplinary conceptual framework, this paper aims to provide tools to deepen in the complex interactions that take place in social-ecological systems and their governance, in order to extend the discussion on the significance of social innovations in regional development and its adaptive capacity.

In recent research, scholars from different disciplines recognize the linkages between social innovation and theories that address the complexities of the human-nature interactions. Using an ecosystem management perspective Biggs et al., (Biggs *et al.* 2010) discuss the relationship between factors that enable transformation processes and the emergence of social innovation in ecosystem management. With a similar approach Westley et al., (2013) points out the agency capacity of individuals in a

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context of social innovation for the transformation of linked social-ecological systems. Whilst from a social perspective, Baker and Mehmood (2013) highlights the role of social innovation as a tool for place-based sustainable development, and give some hints on the connexions between social innovation and the adaptive process of social-ecological systems. From the review on the mentioned literature, it is possible to say that still socially innovative initiatives are not yet being deeply analysed, neither completely understood its influence in regional sustainable development. This paper intends to draw attention to social innovative practices at regional level and give tools understand their role in the adaptive capacity of complex social-ecological systems by focusing on their governance dynamics. At the same time, questions on the significance of social innovation in spatial transformation arise.

It is argued that in social-ecological systems the emergence of new practices and social arrangements, in the form of social innovations, have the potential to enhance adaptive capacity, which allow regions and their governance to use crises and conflicts into opportunities to develop and evolve. Social-ecological systems can be understood as intertwined spheres of society and nature (Folke and Carpenter 2010). This process involves both dynamic interactions and exchanges, and, at the same time, the intertwined relations shape the governance amongst social-ecological systems, their components and other social-ecological systems. Within the governance of social-ecological systems, new social practices develop and interact at different territorial levels, giving rise to multi-layered processes and spatial dynamics affecting and transforming the management and decision-making over common-natural- resources. In the governance of social-ecological systems, regions experiment and innovate through constantly creating and recreating socially innovative practices. From the perspective of the governance of social-ecological systems, social innovation can be understood as a sustainable practice, as it deals with satisfaction of human needs and raises awareness upon conflicts and crises originated by social-ecological interactions (Parra 2013). Therefore, social innovation has a dynamic double role: it aids imperilled social-ecological environments, and it introduces transformations to the governance of social-ecological interactions. Social innovation encompasses changes in social relations, new governance practices, empowerment of institutional capacities; and new ideas, institutions or social arrangements. Looking at this process through adaptive capacity lenses, social innovation brings to the governance of regional social-ecological systems the possibilities to experiment, learn, adapt and transform.

Two main questions guide the discussion in this paper: How does social innovation and governance of social-ecological systems relate in sustainable regional development? Does this relation bring adaptive capacity to a region? These questions are addressed from a theoretical perspective while empirical illustrations give examples of what can be analysed through the proposed conceptual framework. Using as example Huetar North Region in Costa Rica, it is intended to draw attention to particular social innovation dynamics that are being developed to foster regional sustainability. Moreover, the interest is to determine if social innovation dynamics could contribute to adaptive development of the region, and how. This paper propose to use socially constructivist lenses (Moulaert and Van Dyck 2013) to look at social innovation and social-ecological systems, recognizing that (social) innovation in terms of economic growth and productivity does not automatically leads to societal progress (Vollenbroek 2002), to gain significance it must contribute to social inclusion (Moulaert *et al.* 2005).In this paper to social innovations are characterize as dependant in its socio-spatial context (Baker and Mehmood 2013, Van Dyck and Van den Broeck 2013) and understand their role in regional development (Moulaert and Nussbaumer 2005).

Four more sections follow this introduction. Section two presents an insight of the concept of social innovation, its characteristics and roles. In section three, social innovation is framed in the sphere of governance of social-ecological systems, and is explored as a valuable asset in the region's adaptive capacity. In the fourth section, through the exposition of the conceptual framework it is intended to

move the theoretical discussion into empirical fields. To reinforce this argument three examples from the Huetar North Region are presented: 1) concerns with the creation of a national park by community push with the aim of protecting water reservoirs and forest; 2) shows the confluence of different non-governmental stakeholders interested in meliorating the region's sustainable development and labour opportunities; 3) mentions how social and ecological movements stop a transnational open-pit mining project, which had support from the Estate, engaging local and global actors in the process. These examples illustrate the particular conditions not only of a region's governance of social-ecological systems, but also of socially innovative practices and their role in regional development. Therefore, in the final section, in order to understand how social innovation can be reproduced and enhance regional development, the paper concludes with a reflection on the need to proceed with an analysis that considers the territorially embeddedness of social innovations and their on-going transformations.

2. Social innovation: a socio-spatial concept and sustainable asset

Social innovations can be new concepts, products, initiatives, processes, institutions, organizations or social movements, intended to cope social needs and societal challenges. These innovations are crafted by communities that self-organize, or with the aid of formal regional or state institutions, NGO's, business, academics, or a combination of these groups (Biggs *et al.* 2010). Innovation is usually triggered by conflict or crises, because are times when new improvements are needed. But, can be generated by transformations of the previous conditions within the communities or in their context. Opportunities for new products, ideas, arrangements and different ways of doing arise times of uncertainty. During economical, social or environmental crises human and societal needs are imperilled, therefore communities seek for new solutions to their problems and social needs. Social innovation is manifested during the "process of inventing, securing support for, and implementing novel solutions to social needs and problems" (Phills *et al.* 2008, p. 36).

The invention, improvement or transformation of a product, service, process or organization that gives a solution to the identified social need is one of the two 'stages' that comprehend social innovation. This 'product stage' is always accompanied by the 'process stage', which is composed by the manner by which the product is conceived and created, and the process of diffusion and adoption of the new solutions. In regional context, social innovation as a product search for ways to guarantee the provision of public services, bring solutions to inequality, injustice and poverty, defence of human groups rights, environmental degradation, land and resource use; but also as the outcome of the social innovation itself, hence social change and more sustainable forms of community development (Baker and Mehmood 2013). As a process, social innovation refers to the initiatives that pioneered innovation and the ways it is implemented and accepted. The attention is sited in social movements, social arrangements, governance dynamics, institutional and capacity building, inter-sectorial networks, individual creativity and leadership, and environmental context, amongst others, which are organizational and social process that generate social innovation (Baker and Mehmood 2013).

As portrayed, social innovation is not only the name that describes a product or action, but also a *set of practices* (Moulaert, MacCallum, Mehmood, *et al.* 2013), and more even, governance processes that allow empowerment of the resources, developments and outcomes. "Social innovation is a comprehensive concept, pointing to a multidimensional process of social change and its various dimensions" (Moulaert *et al.* 2005, p. 1973). Following these authors, three interconnected dimensions are manifested in social innovation: 1) satisfaction of human needs, 2) changes is social relations, such as governance dynamics, and 3) increasing of empowerment in the sense of socio-political capability and access to resources. Looking at regional systems, social innovations are complex practices that can become dynamic assets. Alleviation of social needs triggers new products, while the process by which they are created and adopted change the former governance dynamics and enhances local-

societal empowerment; and as a result of the process, changes in social behaviours and in the perspective of the problems and solutions arise, and new needs may be created, interconnecting dimensions for societal change.

2.1 The spatial component of social innovation

Social innovation promotes interlinked changes in different levels at the inside of the communities and in their external relationships with other groups. At internal grounds, changes are expressed in the alteration of basic routines, resource and authority flows, and in the norms and beliefs of the social system (Biggs *et al.* 2010). At external levels, mobilization and participation processes become important mechanisms in social innovation practice. This actions lead to improvements in the communications and collaborations within the system or community in which the social innovations arise, and at the same time, with other systems involved or affected by the process. These actions enhance social relations, governance systems and collective empowerment, meaning *innovation in social relations* (Moulaert and Nussbaumer 2005, Moulaert 2009). Improved and new relations arise between individuals inside the 'innovative group', amongst other groups (communal, professional, ethnic, etc.), neighbours, and cities all interacting at regional a scale or even national or global levels.

Social innovations can be triggered by conflicts or by actions that aim to satisfy societal needs, and these conditions are particular to each context in which social innovations developed. Social innovations "must be interpreted in an institutionally and spatially embedded way" (Moulaert *et al.* 2005, p. 1979) because they are shaped according to the needs and resources of a specific community. The on-going processes of social innovation intertwine different spatial levels and scales, as they work with the development agendas of institutions and communal organizations, and engage in the process actors from different socio-political arenas. In order to assure social wellbeing "opportunity spaces at micro scales may make creative strategies possible at macro scales" (Moulaert, MacCallum, and Hillier 2013, p. 17), provoking social innovation to participate as an agent meant to contribute to social inclusion (Moulaert *et al.* 2005). Therefore, at territorial level, social innovations and the conditions that foster them "cannot be separated either from its social-cultural, or from its social-political context" (Moulaert, MacCallum, and Hillier 2013, p. 17).

Even though, the conditions for crafting and practicing social innovation are particular to each context, social innovation maybe reproduced throughout the system. Regions, in which socially innovative dynamics arise, experienced constant changes in their governance relations, build upon networks of trust and collaboration and increase their empowerment and participation socio-political processes. Hence, social innovative actions can become institutionally embedded and territorially reproduced (Moulaert 2009) developing in a complex dynamic in which fixed and particular situations detonate flows of actions creating new scales and social connexions, and changing the previous socio-spatial settings.

As explained, outcomes of social innovation may be new organizations, social movements, governance arrangements, social practices, or improvements in institutional development, plus the product or invention, object of the social innovation. According to Baker & Mehmood (2013) social innovation significance strives in the impact on the broader, social, political and economic context that surrounds the triggering conflict. The impact or effect of social innovative outcomes and processes may be measured by three grounded variables: 1) scale, such as the number of people affected; 2) scope, requiring societal improvement in a deep multidimensional way; and 3) resonance, that is, capturing people's imagination in a powerful manner (Baker and Mehmood 2013). Therefore, a significant tangible improvement (Neumeier 2012) should be perceived by the actors involved in the process, along with changes in the territorial context where the social innovation is rooted.

2.2 Social innovation and sustainable development

The generalized definition of sustainable development suggests a balance between economic, social and environmental sustainability, in order to do a better management of the resources and enhance both current and future potential to meet human needs and aspirations (Brundtland 1987). But scholars remark that development through sustainable practices needs more than pointing out the struggle of needs' satisfaction, or highlighting the conflicts in economical growth, poverty and environmental justice. If it so, sustainability debate will be narrowly examining economic and ecologic logics (Parra 2013). According to these observations, sustainable development by embracing all aspects of human development may improve quality of life and achieve wellbeing, through the management of the relations between human-social needs and natural-environmental sustainability and its governance. Underlining the role of the social component in sustainable development, the attention is drawn to regions their innovative capacity and institutional conditions. In this matter, Vollenbroek suggests that the "strive for sustainable development needs an approach towards innovation that can be characterized as society pull" (2002, p. 215). This suggestion may imply that when a community search for new and better ways to solve social and environmental conflicts, while moving towards a sustainable development, the outcomes are social innovations that have an impact on the broader, social, political, economic and environmental context.

Social innovations that stimulate sustainable regional development act into three interconnected –sustainable- dimensions, rooted in each particular context, and articulated in different spatial levels. First, societal satisfaction of needs (including environmental quality (Mehmood and Parra 2013), access to natural resources, health improvement, equity and environmental justice) require of new or renovated 'products' that guarantee, not only the satisfaction, but its sustainability in long term. Second, the collective process of social innovation promotes new or improved governance relations amongst the community in which they arise, and other spatial levels since it highlights –local, regional, national, global- unsustainable development matters (Mehmood and Parra 2013). Third, through its product-process dynamic, social innovation encourages empowerment, of natural resources, environmental conditions and institutional capacity grounded in the communities and regional systems. This community empowerment comes from the collective definition of needs, the struggle for the satisfaction of social needs that have not been fulfilled through other channels (Parra 2013), and from the know-how of their own socio-ecological dynamics and institutional capacity.

Societal needs and their fulfilment are particular in each community. Regions, and the communities within them, engage in sustainable practices according to their capacities and resources. In this sense, sustainable development, as social innovation, is a territorial concept embedded in social conditions and biophysical characteristics of the system embracing sustainability. Is a process that "needs to be understood as a spatial concept because it is grounded in the material circumstances of people and place" (Morgan, 2011, p. 88 in Parra 2013, p. 145). Sustainable regional development depends on the ability of each community to understand its own social, environmental dynamics, institutional capacities and resources, and to use these characteristics to promote novel ways to govern their social-ecological interactions.

In this section it was argued that by its characteristics social innovation reveals as a dynamic regional sustainable asset, playing various roles in the articulation between different spatial levels and dimensions. In its form as outcome, is the object of the innovative process and the solution by which social conflict is engaged. Its active role manifests by the transformation attributes that are developed during the process of social innovation. Social innovation, not only transforms a precarious or conflictive situation into a resulting improved one, but also transforms the initial conditions during the

process. Social innovation allows the satisfaction of societal-environmental needs and encourages the renewal of governance relations, and as result, new needs and conflicts arise. In the next section, it is discussed the dynamic role of social innovation which may allow regions develop by increasing its institutional and adaptive capacities, through governance processes that ameliorate social and environmental conflicts.

3. Social innovation within a social-ecological system's perspective

Within this paper, regions are seen as territories in which complex dynamics between social-institutional processes, spatial forms (Massey 1995 in Parra 2010) and ecosystems (Baker and Mehmood 2013) take place. The relations between each other are linked and reciprocal, shaping one another by complex processes of exchange and reproduction. According to Elinor Ostrom, in order to understand these dynamics and interactions it is necessary an approach that puts side-by-side the social and the environmental (Ostrom *et al.* 2012). For regions and the resource management and decision-making, the social and technical aspects need to be understood in order to unveil and further promote their own conditions that guide the paths of sustainable development, far from panacea solutions (2012). In her speech, Ostrom outlines that is needed to recognise the governance systems that 'work in practice' fitting in the diversity of ecological and social conditions, which manoeuvre the uncertainties added by the interaction with the internal and the external factors and other systems. Through this perspective it is essential to pay attention at social-ecological systems and their governance, not only in a structural way, but to understand the complexities within their interactions (Ostrom and Cox 2010).

Social-ecological systems can be understood as intertwined spheres of society and nature, defined as integrated systems "of ecosystems and human society with reciprocal feedback and interdependence" (Folke and Carpenter 2010, fig. Table 1). This theory emphasizes the diverse and multi-level linkages between both systems (Folke 2006); and relates the management and decision-making of natural resources with the social processes behind theses practices recognizing the variety of geographical settings, cultures and ecosystems of the social-ecological systems (Berkes *et al.* 2003), and the territory that embraces the social-ecological systems. This process involves both dynamic interactions and exchanges, and, at the same time, the intertwined relations shape the governance within social-ecological systems, their components and other social-ecological systems related.

3.1 Social innovation within the governance of social-ecological systems

In this paper it is argued that social innovations play a key role in the governance of regional social-ecological systems, and in region's sustainable development. Governance of socio-ecological systems cope with the satisfaction of human-environmental needs by relating "management practices based on ecological understanding, to the social mechanism behind these practices" (Berkes *et al.* 2003, p. 4). Moreover, when sustainable development is steered by governance, is possible to comprehend that the articulations between economic development and environmental sustainability are "indivisible from society in terms of social relationships" (Parra 2010, p. 493). Examples from the literature show these interlinked relations between indigenous protected areas and its surrounding agro-industrial land uses (Brondizio *et al.* 2009); forestry and collective action (Agrawal and Chhatre 2006); the role of social networks in natural resource governance (Bodin and Crona 2009), amongst many others.

Governance is defined as the structures and processes by which societies share power, shapes individual and collective actions (Young 1992 cited by Lebel *et al.* 2006, p. 2). In governance systems, negotiations, arrangements and relations emerge from the interaction of different actors (formal regional-state institutions, self-organizations, non-profit organizations, private sector) with their socio-

spatial context. Within social-ecological systems, this palette of actors plays different roles at interlinked levels in the management and decision making of social-environmental resources. The new socio-institutional arrangements develop at and interact with different territorial scales, allowing the emergence of multi-layered institutional dynamics, that are capable of dealing with place-embedded and cultural dependent challenges and conflicts; and at the same time, the effects from these interactions have echo outside the community in which they arise. These dynamics promote a constant creation and recreation of socially innovative processes within social-ecological systems.

From an empirical perspective, the exploration of social innovations using the governance of the social-ecological systems lenses, gives relevance to the emergence of societal actions and the nested dynamics between humans and nature. In the challenge of building sustainable regions, social innovation can be identified as "the processes by which people raise and frame socio-ecological problems, produce knowledge to deal with them and become socially engaged to address problems or transform unsustainable situations" (Parra 2013, p. 150). The social and spatial transformations that social innovations promote, not only engages with the satisfaction, creation and re-creation of social needs, but also shape values and normative behaviours through the collective action of the governance of social ecological systems. Consequently, this approach goes beyond the sustainability goal of satisfaction, and intend to extend its outcomes towards equity and social cohesion (Cook and Swyngedouw 2012, Parra 2013), sustainable place-making (Baker and Mehmood 2013) and resilient social-ecological systems (Folke and Carpenter 2010).

Social and political conflicts, environmental or economical crises, natural disasters are part of the uncertainties that emerge amongst the interactions social-ecological systems that provide stimulus for innovation (Prowman et al. 2007 in Biggs *et al.* 2010); but in complex social-ecological systems social innovation plays a bigger role than just providing a product that fulfil the needs or diminish stressful situations at specific time. Social innovation represent different parts in the social-ecological systems play: results of the interactions and actions within them and, other systems and external influences; is a provides response from the governance of the social-ecological systems in front of conflicts, crises or needs; emerges of new governance systems, norms and levels of exchange and interaction; is the shapes and transforms the previous settings –social, natural, spatial - of the system into renewed resources, components and relations.

3.2 Social innovation for regional adaptive capacity

According to the discussion followed in this paper, social innovations within the governance of social-ecological systems trigger and participate of dynamic and complex processes. As result of socially innovative processes, new social practices develop and interact at different territorial levels, giving rise to multi-layered processes and spatial dynamics affecting and transforming the management and decision-making over common-natural- resources. In this sense, in the governance of social-ecological systems, regions experiment and innovate through constantly creating and recreating socially innovative practices. Looking at this process through adaptive capacity lenses, social innovation brings to regions as complex social-ecological systems, and social-ecological systems within it, the possibilities to experiment, learn, adapt and transform.

Adaptive capacity can be understood as "the capacity of a SES [social-ecological systems] to learn, combine experience and knowledge, adjust its responses to changing external drivers and internal processes, and continue developing within the current stability domain or basin of attraction" (Folke and Carpenter 2010). When communities and social groups in a region practice social innovation to deal with unsustainable practices, are steering their development though paths of social sustainability (Parra 2013) and, at the same time, these innovative practices enhance their capacity to adapt (Rammel

et al. 2007). Social innovation, as a dynamic process, in governance of social-ecological systems, is often a driving force of adaptive capacity. Berkes et al. (2003) reflect: for success and survival, it is required an active adaptation, meaning not only being reactive to change but be involved in creating and shaping it and allowing space for renewal. Transcending social-ecological systems dynamics towards regional development, in which novelty rise and diffuses, give regions the possibility to be better able to resist and adapt to external shocks (Baker and Mehmood 2013, p. 8). Social innovation may foster in regions, aiming for sustainability, the ability to respond and take collective action in front of societal needs, conflicts or crises.

4. From theory to illustrations, from asset to practice?

In this section, an empirical approach is outlined by arguing how to look at social innovation from a social-ecological systems perspective in a context of regional sustainable development. This paper suggests to use the Social-Ecological Systems –SES- Framework (Ostrom and Cox 2010) to analyse social innovation as an action situation within the social-ecological systems, with an specific focus in the governance dynamics, interactions and outcomes linked to the socially innovative practices. With the objective of enrichment of theory and practice on social innovation, social-ecological systems and sustainable regional development, the framework suggested here should not be considered a rigid guideline, but a work in progress; which will be in constant revision as it is confronted with theory and experimentation. As Ostrom & Cox pointed "the relationship between framework and theory development is complementary and reciprocal"(2010, p. 455). Keeping this feedback process in mind, this section offers examples of social innovation that can be worth seeing through the lenses of the suggested conceptual framework; also, recognize challenges and possibilities of the use of the framework and the arguments used in this paper.

4.1 Exploring a conceptual framework for social-innovation

Taking as a base the revised version of the SES framework suggested by McGinnis & Ostrom (2011), this paper proposes a multidisciplinary, multi-factor and multi-level framework for the analysis of socially innovative practices in regional sustainable development. The framework presented here intends to experiment with SES framework and its possible applications. The conceptual framework for the analysis of social innovation within the governance of SES (Figure 1) incorporate fully some of the tiers and relations of the SES framework, while narrow others and suggest new ones in order to address the practice of social innovation as both a product and a dynamic-feedback process.

Figure 1 frames social innovation within a context of complex social-ecological systems (McGinnis and Ostrom 2011): in which boundaries of the resource systems are not clearly defined; several resources or ecosystem services may be involved in the interactions; are part of an heterogenic context with diversity of sub-systems; are interlinked with other social-ecological systems within or outside the region; show overlapping governance systems; the action-situations may respond to internal or external factors and produce different outcomes, which at the same time, trigger new states of the current system's conditions. In the diagram, social innovation is situated at the 'interactions' space, and is understood as an action-process of governance triggered by sustainability issues: satisfaction of human needs, conflicts and crises. Adaptive capacity is seen as one of the outcomes of social innovations, and it may be used as assessment of the social-ecological system performance, through four main conditions: 1) response to change and uncertainty, 2) capacity for reorganization and renewal, 3) knowledge-learning dynamics and the importance of self-organization, 4) multi-level governance and network dynamics (Berkes *et al.* 2003).

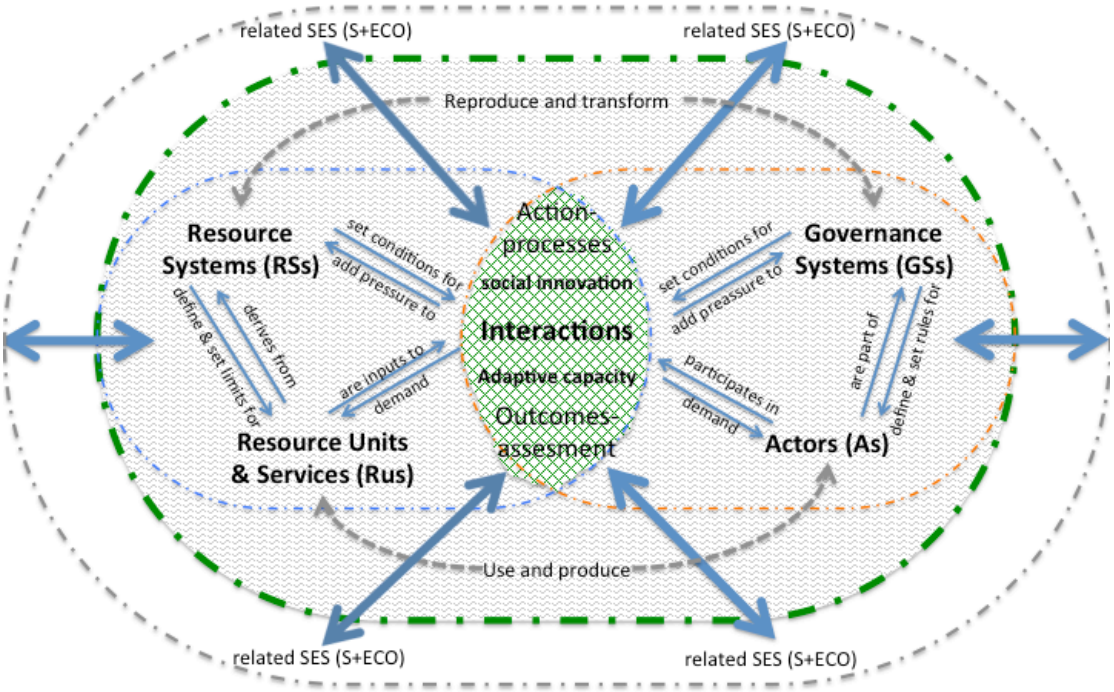

Figure 1. Diagram of the conceptual framework for the analysis of social innovation within the governance of SES.

In the proposed framework, the 'top-tired SES components' remain, although there are analyzed in terms of the socially innovative processes that are under examination. The governance systems (GS) tier reflects on the governance system in which the social innovation develops, and the actors are those who are part of the governance processes of social innovation. Although, given the dynamic characteristics of social innovation it is important to keep in mind that "social innovation supports and is in turn supported by new governance practices" and "[n]ew forms of governance can act in a contradictory manner, empowering new actors but disempowering others" (Swyngedouw 2005 p.1992 in Baker and Mehmood 2013, p. 10). The 'second-tier components' of GS is constituted differently of the one proposed by McGinniss & Ostrom (2011): GS1 Multi-scalar and multi-level components (policy area, geographic scale, population and network structure); GS2 Regime type; GS3 Agents and rule-making actors (public sector, private sector, NGO's, community-based organizations, hybrid organizations, individuals); GS4 Rules-in-use (operational, collective, constitutional-choice rules); GS5 Property-rights system; GS6 Path-dependency and continuity; GS7 Norms and strategies; GS8 Social innovation capacity; GS9 Planning system. The 'second-tier components' of RSs, RUs and As remain the same, but paying attention to the transformations that the socially innovative processes do to the social and spatial domains. "Social actions are considered innovation by virtue of the impact they have on the boarder social, economic and political context within which such actions arise" (Baker and Mehmood 2013, p. 7), and their impact or effect in the relations and interactions of the social-ecological system may be measured by scale, scope and resonance (Baker and Mehmood 2013).

The conceptual framework for social innovation adds to the logical relations (direct arrows) between the 'first-tier categories' (McGinnis and Ostrom 2011) and express these relationships and the interactions on a canvas that reflects the intertwined and feedback relations between the social systems and ecological systems, and other SES (S and ECO in the SES framework) that may add pressure to the system under scrutiny. The double-sided continuous arrows show this direct effect over the social-ecological system, while the discontinuous line in the border of the systems express the permeability and flexibility of the system. The area that holds the social and ecological systems is bigger than those,

reminding that the interactions occur within a territory: path-dependency and spatial embeddedness. The double-sided discontinuous curved line symbolizes the feedback and iterative relations between the ecological and social systems, in social innovative processes; this dynamic is one of constant use, production, reproduction and transformation.

4.2 Huetar North Region: regional dynamics to look at?

The Huetar North region, located in Costa Rica, can be seen as an example of complex dynamics that take place in a territory moving towards sustainable development. Although Costa Rica represents only 0,03% of the planet's surface, it holds almost 4% of the world's entire biodiversity (Obando Acuña 2007); bringing inevitable tensions in the uses, transformation and protection of nature. In places of this kind the degrees of complexity and interactions allow the emergence of new structures, properties, functions and behaviours (Lister 2008), and encourages processes of social innovation operating at multiple spatial scales. The region uses national parks, other protected areas and water reservoirs for national electricity generation, farming irrigation and drinkable water, tourism and agriculture. Five Municipalities integrate the region, four of them are part of the boundary between Costa Rica and Nicaragua; therefore, natural and social transactions between the two countries are part of the governance process. Several socially innovative processes are being developed in this region searching for more sustainable paths. These social innovations are action-processes triggered by external pressures that jeopardize resources, agriculture and economic crises, and societal needs that require new environmental services or the protection of resources for a continuous supply. The examples presented as follows help to illustrate the social innovations that are taking place in the region:

1) Water National Park Juan Castro Blanco: an initiative to protect water supply for future generations. In 1968, by request of their citizens, the Municipality of San Carlos created the natural protected area National Forest Cerro Platanar with 2.500Ha with the aim to protect the landscapes and its water springs. In 1975 the area is declared as a National Forestry Reserve Juan Castro Blanco; several academic studies where made in the park, which determine the value of the water resource, its importance in biodiversity conservation, and the deforestation threat (Bonilla 1981); as a consequence the community organized again and asked for a change of the protective category and expand the area of the park. Therefore, in 1992 and by collective action, the park gained the highest protective category with a new extension of 14.458Ha, almost six times its original size. This park presents an altitudinal distribution in between 490m and 2.330m above sea level, and produce an average of 996 millions cubic meters of water per year, from which 9.9 millions are for human consumption (SINAC 2012). Due to this reason, in 2003 a new protective category was created in Costa Rica, and the park became Water National Park Juan Castro Blanco. Nowadays, this park provides potable water to 150 communities from four different municipalities, produces 12% of the national energy production (hydroelectricity). One of the most significant characteristics of the governance process is land-rights: 90% of the park territory belongs to private owners. This situation motivates a new community self-organized non-profit association –APANAJUCA- that made a special agreement with the SINAC (the national conservation agency) and the Ministry of Environment (MINAET) in order to take responsibility for the safeguard and management of the park. APANAJUCA, jointly with COOPELESCA, the regional cooperative for energy production and distribution, created a trust fund in 2009 to buy the lands that are in private hands and turn them new common-owned protected area.

2) Agency for the Development of the North Zone: more sustainable ways for agroindustry and employment. Over the past 12 years the private and public sectors have been working together through a bottom-up self-organized Agency for the Development of the Northern Huetar Region (ADRHN) towards a successful sustainable development of the region. This initiative had no precedent in Costa

Rica; and, the organization considers itself as a Territorial Development Experience, with two goals: to become a competitive region and to develop competitive entrepreneurships (ADRHN 2012). The ADRHN is an association of individuals who's role is to provide an open forum space for the discussion and analysis of the Huetar North region's challenges and opportunities, and through collective action promote and implement solutions to their needs and conflicts. Their values are guided by inclusion, social justice and environmental sustainability, and encourage socio-productive linkages and empowerment. Through the ADRHN several groups and sectors–even not being associates- found a space to develop ideas and propositions, such as the education, TIC, tourism, amongst others. These groups have the opportunity to open direct communication channels with governmental agencies and formal institutions due to the agreements of cooperation between the ADRHN and formal networks. Three concrete examples of their action that can be mention are: the Sustainable Cluster of Forestry Industry, Forum for Sustainable Tourism, and the Congress for Emergent Energies in partnership with COOPELESCA. Due to the efforts of the ADRHN, many funding for development projects has been directed to the Huetar North region towards new infrastructure, the improvement of human capital and agro-innovation research funds.

3) Crucitas social-ecological movement: protection of endangered species and ecosystems. Crucitas is a private open-pit mining project for the extraction of gold, owned by the Canadian corporation Infinito Gold Ltd.-. The properties under mining concession have an extension of 227,6Ha. Although they are private property, the area was covered by primary and secondary rainforest, which in Costa Rica are protected by law. In order to change the land use of the area and remove its protective category, the project was supported by Costa Rica's National Government through the declaration of National Interest by the National Decree No. 34801-MINAET, in 2008. After the negotiation become public, several environmental organizations start to manifest their disagreement with the decision of the central government; and with an intense and sudden reaction, conservationist organizations, local authorities, politicians, public universities, communal associations and civil society, come together in a national social-ecological movement against the gold mining extraction in Crucitas, demanding legally Costa Rica's Estate government, SINAC (the national conservation agency) and Infinito Industries. In 2010, national law tribunals condemned the demanded to make an integral restoration and pay for environmental damages, estimated in $4.6 million the environmental damage of Crucita's mining project (La Nación 2012). According Fundación Neotrópica (2012), the massive deforestation of the Almendro tree done in the site may lead to the extinction of the Great Green Macaw (*ara ambigus*). Another very important argument in the case was the water pollution in rivers and aquifers by the use of cyanide in the mining process and the erosion of the soil, which impacts reach Nicaragua's territory (AIDA 2008). Recently, Infinito Gold Ltda, announce its intention to continue a lawsuit against Costa Rica for an amount of $1.092 millions. This action has provoked the response of Canadian environmental groups (MiningWatch 2013) asking for world-wide public support against the company. One of the main outcomes is the creation and approval of a Law that prohibits open-pit mining in Costa Rica.

4.3 Challenges and possibilities

One of the biggest challenges in the analysis of social innovations for regional sustainable development is to avoid the 'panacea problem' (Ostrom and Cox 2010). For this, is necessary to keep in mind that social innovations, as well as societal needs and governance processes, are territorial embedded processes (Moulaert and Nussbaumer 2005). Social innovation respond to specific conflicts and needs from a specific community, and the conditions for the development, implementation and reproduction of social innovation are path-dependendent (Moulaert *et al.* 2005, Baker and Mehmood 2013, Mehmood and Parra 2013). Therefore, social innovations cannot be duplicated from one region to another, from one conflict to another. An analysis of social innovation from a social-ecological

systems perspective, open possibilities to understand and further reproduce regional conditions that support and encourage social innovations.

The conceptual framework presented in this paper, intend to give scholars an opportunity to experiment and "develop empirically supported theories that are the foundation for policy analysis" (Young *et al.* 2006) and step away from rigid models and conceptions in regional development. According to Biggs et al. (Biggs *et al.* 2010) social innovation is a phenomena that cannot be planned or directly produced, but it is possible to create environments in which it can be stimulated. In this sense, a big challenge is outlined: how is the planning system that incorporates and foster social innovation and its outcomes for regional adaptive capacity? What agents participate in the planning system? How to integrate the social and spatial transformations that social innovation processes promote in a common view of regional development? What are the characteristics of the governance systems for such planning system? The answers may not be easy ones, and the expectancy is high: actor participation and integrated planning, flexibility to deal with both uncertainty and abrupt change, enhance learning of complex social-ecological systems, promote experimentation and innovation and supports cross-scale institutional linkages (Stockholm Resilience Center 2010).

For Costa Rica, a research under the lenses of governance of social-ecological systems and social innovations may bring possibilities to understand the role that the last one plays in regional sustainable development. There are no studies that elaborate on the conflicts amongst social and environmental interactions and their governance in Costa Rica context, neither on the socially innovative practices that have been taking place. Furthermore, a combined focus on governance of social-ecological systems and social innovation is of significant relevance for developing countries, which are simultaneously facing sustainability and development challenges. Governance analysis and understanding of the emergence of institutional capacities and social innovations aids in the comprehension of how norms and rules overcome social dilemmas (Ostrom 2005) in these particular contexts.

5. Conclusions

This paper is an invitation to explore social innovation through the lenses of governance of social-ecological systems. Through them, social innovation is seen as a dynamic outcome of the governance of social-ecological systems, which plays several roles within social-ecological interactions. Social innovation as a product search for solutions to inequality, injustice and poverty, environmental degradation, land and resource use; but also is the product of social innovation itself, in the form of social change and more sustainable forms of community development (Baker and Mehmood 2013). As a process, social innovation builds a comprehensive set of practices (Moulaert, MacCallum, Mehmood, *et al.* 2013) in multi-level governance processes that stimulate social and spatial transformations. At regional scale, this paper agues that in social-ecological systems the emergence of new practices and social arrangements, in the form of social innovations, have the potential to enhance adaptive capacity, which allow regions and their governance to use crises and conflicts into opportunities to develop and evolve.

In complex social-ecological systems social innovation may be a result of the interactions and actions within them and, other systems and external influences; is a response provided by the governance of the social-ecological systems in front of conflicts, crises or needs; is the emergence of new governance systems, norms and levels of exchange and interaction; is the shaping and transformation of the previous settings –social, natural, spatial - of the system into renewed resources, components and relations. Looking at this processes through adaptive capacity lenses, social innovation brings to regions as complex social-ecological systems the possibilities to experiment, learn, adapt and

transform. This paper suggests a conceptual framework to look at social innovation as a dynamic asset in regional sustainable development, through the analysis of social innovation as part of the intertwined interactions in the governance of social-ecological systems. By putting in dialog these literatures, this paper intends to create synergies between social and ecological approaches; and promote an analysis of the systems, which incorporates the complexities of the system.

One of the strengths of the social-ecological system approach to social innovations in regional sustainable development is that allows an enrichment of regional development theory through a place-based, and territorially embedded research methodology. Elinor Ostrom (Ostrom *et al.* 2012) insisted on the importance on case analysis to avoid the 'panacea problem'; and following her arguments it is clear that more empirical research is needed in order to understand the conditions of the emergence of social innovations and visualize the similarities and coincidences between successful and unsuccessful experiences.

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